

Advanced AI Techniques (WS04)

Exercise sheet 8

Deadline: 16.12.04

Exercise 1 (6 points)

Consider the following SLP S , describing a small part of a subway network:

0.25 : $connected(a, c)$.

0.25 : $connected(c, b)$.

0.25 : $connected(c, d)$.

0.25 : $connected(d, b)$.

0.6 : $reachable(X, Y) : - connected(X, Y)$.

0.4 : $reachable(X, Y) : - connected(X, Z), reachable(Z, Y)$.

We want to query the SLP with the goal $reachable(a, b)$.

- To begin with, draw the SLD-tree for the logical query $reachable(a, b)$.
- Now augment the tree with the probabilities of all derivations (paths to a particular leaf), i.e. compute $P_D(g|S)$ for all derivations g .
- From that, compute the probabilities for the refutations of the goal, i.e. $P_R(r|S)$ for refutations r , and compute the overall probability assigned to the goal, $P_A(reachable(a, b)|S)$.

Exercise 2 (6 points)

The following Bayesian logic program (BLP) is given:

$anc(b, a)$.

$anc(c, a)$.

$anc(c, d)$.

$q(b)$.

$q(c)$.

$p(X) | q(X)$.

$q(X) | p(Y), anc(Y, X)$.

The $anc(X, Y)$ predicate is logical, the $p(X), q(X)$ predicates probabilistic. Consequently, the clauses for $p(X), q(X)$ have associated conditional probability tables, which are not given here.

- Construct the ground Bayesian Network for this BLP.
- For evaluating a particular query, it is in general not necessary to consider the whole ground network. Show which part of the ground network we would have to look at for answering the query $P(p(a))$.